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a Loofeness, they torrify a Spoonful of white Cummin-seed, and a little powdered Ginger, which they swallow mixt with Sugar. I have seen them cure Fevers which begin with a shivering Fit, by giving the Patient three large Pills made of Ginger, black Cummin and long Pepper. For Tertian Agues, they give the Person for three Days together three Spoonfuls of the Juice of *Teucrium*, or great Germander, with a little Salt and Ginger. I am, &c.

P A P I N.

XXIII. *A Letter from Father Bourzes to Father Estienne Souciet, concerning the Luminous Appearance observable in the Wake of Ships in the Indian Seas, &c. Taken from the Ninth Volume of Letters of the Missionary Jesuits.*

Reverend Father,

AS I was ready to embark for the *Indies*, I receiv'd your Letter, in which you desire me to allow some time for making Inquiries into Arts and Sciences, as far as the necessary Business of my Mission will permit me, and to communicate to you such Discoveries as I shall make.

I met with in this Voyage some Things which I believe would have been acceptable to you; but wanting Instruments, which you know are absolutely necessary to make any Observation with exactness, I was
forced

forced to content my self with such Observations only as I could make with my naked Eye, without any other Assistance.

I shall begin with a *Phænomenon* in Natural Philosophy, which has something new in it to those that never were at Sea; and perhaps those that have been there, never observed it with sufficient Attention.

You have read what Philosophers say concerning those Sparkles of Light which appear in the Night time on the Surface of the Sea; but you must observe at the same time, that they pass over this *Phænomenon* very slightly, or at least endeavour more to give a reason for it, that may be agreeable to their own Principles, than to explain it as it really is. Before they undertake to account for the Wonders of Nature, in my Opinion they ought to enquire very well into all Particulars; which I thought necessary to do on this present Subject.

I. When the Ship ran apace, we often observed a great Light in the Wake of the Ship, or the Water that is broken and divided by the Ship in its Passage. Those that did not view it nearly, often attributed it to the Moon, the Stars, or the Lanthorn at the Stern; as I did my self, when I first perceived it: But having a Window that look'd directly down upon it, I was soon undeceived; especially when I saw it appear more bright, when the Moon was under the Horizon, the Stars covered with Clouds, and no Lights in the Lanthorn, or any other Light whatsoever cast upon the Surface of the Water.

II. This Light was not always equal; some Days it was very little, others not at all; sometimes brighter, others fainter; sometimes it was very vivid, and at other times nothing was to be seen.

III. As

III. As to its Brightness, perhaps you may be surprized when I tell you that I could easily read by it, tho' I was 9 or 10 Foot above it from the Surface of the Water; as I did particularly on the 12th of *June* and the 10th of *July* 1704. But I must inform you that I could read only the Title of my Book, which was in large Letters: Yet this seemed incredible to those I told it to; but you may believe it, and I assure you that it is a real Truth.

IV. As to the Extent of this Light, sometimes all the Wake appeared Luminous to 30 or 40 Foot distant from the Ship; but the Light was very faint at any considerable distance.

V. Some Days one might easily distinguish in the Wake such Particles as were Luminous from those that were not: At other times there was no difference. The Wake seemed then like a River of Milk, and was very pleasant to look on; as it appear'd particularly on the 10th of *July* 1704.

VI. At such times as we could distinguish the bright Parts from the others, we observed that they were not all of the same Figure: Some of 'em appear'd like Points of Light; others almost as large as Stars as they appear to the naked Eye. We saw some that looked like Globules, of a Line or two in Diameter; and others like Globes as big as ones Head. Oftentimes these *Phosphori* form'd themselves into squares, of 3 or 4 Inches long, and one or two broad. Sometimes we could see all these different Figures at the same time; and particularly on the 12th of *June*, the Wake of the Vessel was full of large *Vortices* of Light and these oblong Squares, which I have been speaking of. An other Day, when our Ship sailed slowly, the *Vortices* appeared and disappeared again immediately like flashes of Lightning.

VII. Not only the Wake of a Ship produces this Light, but Fishes also in swimming leave behind 'em a lumi-

luminous Tract; which is so bright that one may distinguish the largeness of the Fish, and know of what Species it is. I have sometimes seen a great many Fishes playing in the Sea, which have made a kind of artificial Fire in the Water that was very pleasant to look on. And often only a Rope placed cross-wise will so break the Water, that it will become luminous.

VIII. If one takes some Water out of the Sea, and stirs it never so little with his Hand in the dark, he may see in it an infinite Number of bright Particles.

IX. Or if one dips a piece of Linnen in Sea Water, and twists or wrings it in a dark Place, he shall see the same thing; and if he does so, tho' it be half dry, yet it will produce abundance of bright Sparks.

X. When one of the Sparkles is once formed, it remains a long time; and if it fix upon any thing that is solid, as for instance on the side or edge of a Vessel, it will continue shining for some Hours together.

XI. It is not always that this Light appears, tho' the Sea be in great Motion; nor does it always happen when the Ship sails fastest: Neither is it the simple beating of the Waves against one another that produces this Brightness, as far as I could perceive: But I have observed that the beating of the Waves against the Shore has sometimes produced it in great plenty; and on the Coast of *Brazil* the Shore was one Night so very bright, that it appeared as if it had been all on Fire.

XII. The Production of this Light depends very much on the Quality of the Water; and, if I am not deceiv'd, generally speaking, I may assert, other circumstances being equal, that the Light is largest when the Water is fattest and fullest of Foam; for in the main Sea the Water is not every where equally pure; and sometimes if one dips Linnen into the Sea, it is clammy when it is drawn up again. And I have often observed, that when

the Wake of the Ship was brightest, the Water was more fat and glutinous ; and Linnen moisten'd with it produced a great deal of Light, if it were stir'd or mov'd briskly.

XIII. Besides, in sailing over some Places of the Sea, we find a Matter or Substance of different Colours, sometimes red, sometimes yellow. In looking at it, one would think it was Saw-duft : Our Sailors say it is the Spawn or Seed of Whales. What it is, is not certain ; but when we draw up Water in passing over these Places, it is always viscous and glutinous. Our Mariners also say, that there are a great many heaps or Banks of this Spawn in the North ; and that sometimes in the Night they appear all over of a bright Light, without being put in Motion by any Vessel or Fish passing by them.

XIV. But to confirm farther what I say, *viz.* That the Water, the more glutinous it is, the more it is disposed to become luminous, I shall add one particular which I saw myself. One Day we took in our Ship a Fish which some thought was a *Boneta*. The inside of the Mouth of the Fish appeared in the Night like a burning Coal ; so that without any other Light, I could read by it the same Characters that I read by the Light in the Wake of the Ship. It's Mouth being full of a viscous Humour, we rubbed a piece of Wood with it, which immediately became all over luminous ; but as soon as the moisture was dried up, the Light was extinguish'd.

These are the Principal Observations that I made upon this *Phænomenon* : And I leave you to examine if all these Particulars can be explained by the System of such as assert, that the Principle of this Light consists in the Motion of a subtle Matter, or Globules, caused by a violent agitation of different kinds of Salts.

I shall add next a word or two concerning Marine Rain-bows, which I observed after a great Tempest off of the Cape of *Good-Hope*. The Sea was then very much tossed, and the Wind carrying off the tops of the Waves, made a kind of Rain, in which the Rays of the Sun painted the Colours of a Rain-bow. It is true the common *Iris* has this advantage over ours, that its Colours are more lively, distinct, and of longer Extent. In the Marine *Iris* we could distinguish only two Colours, *viz.* a dark Yellow on that side next the Sun, and a pale Green on the opposite side: The other Colours were too faint to be distinguish'd: But in recompence for this, these *Iris's* are in a greater Number; one may see 20 or 30 of 'em together; they appear at Noon-day, and in a Position opposite to that of the common Rain-bow, that is to say, their Curve is turned as it were towards the bottom of the Sea. Tho' in these long Voyages one sees nothing but Water and Sky, yet each of 'em affords such Wonders in Nature, as may well employ the time of those that have Knowledge enough to discover them:

Lastly, to put an end to these Observations upon Light, I shall add only one more, concerning Exhalations in the Night, that form in the Air a long Tract of Light. These Exhalations make a Tract of Light much larger in the *Indies* than they do in *Europe*. I have seen two or three that I should have taken for real Rockets: They appear'd near the Earth, and cast a Light like that of the Moon some Days after her Change. They fall slowly, and in falling make a Curve Line; especially one which I saw on the main Ocean, at a great distance off at Sea, on the Coast of *Malabar*. I am, &c.

De BOURZES.